

SECTION IV PERFORMANCE TESTS

4-1. INTRODUCTION

4-2. The procedures in this section test the instrument's electrical performance using the specifications of Table 1-1 as the performance standards. All tests can be performed without access to the interior of the 5004A. A simpler operational test is included in Section III under Operator's Check.

4-3. TEST EQUIPMENT REQUIRED (see Table 4-1)

Table 4-1. Required Test Equipment

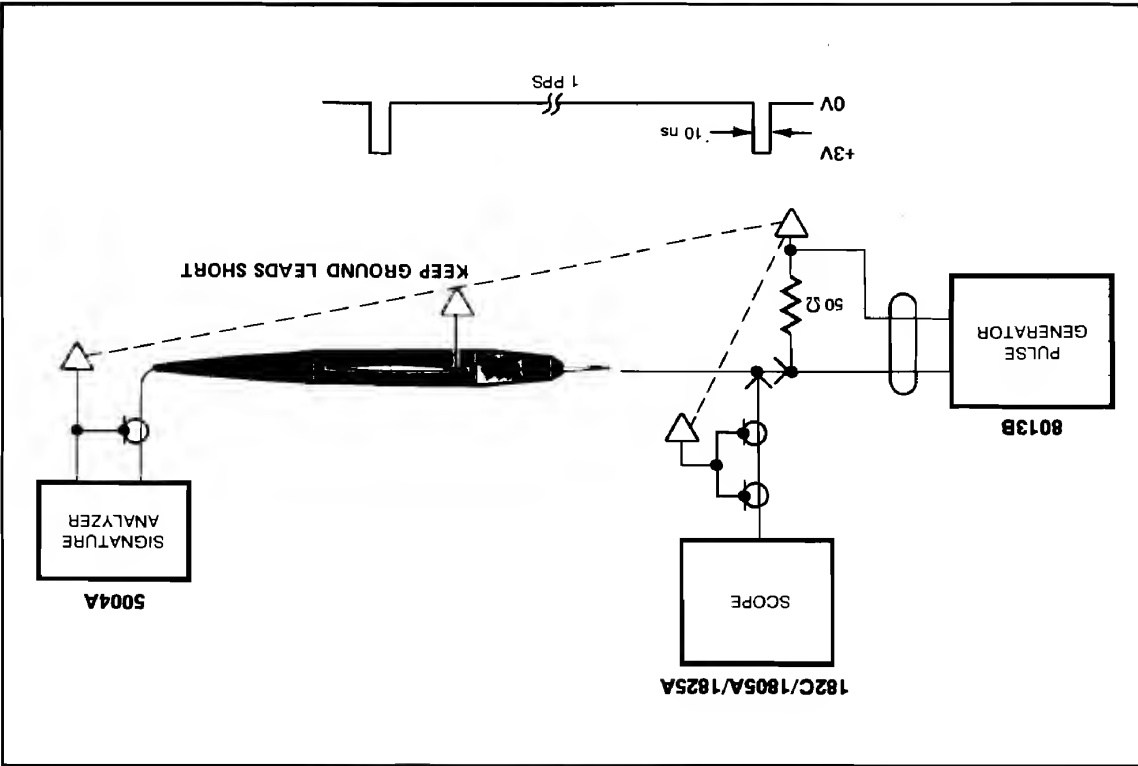
INSTRUMENT	CRITICAL SPECS	RECOMMENDED HP MODEL
Pulse Generator	5 ns—100 ns delay	8007B
Pulse Generator	10 MHz, 5 volts pulse	8013B
Oscilloscope with dual-trace vertical amp.	100 MHz	182C, 1805A/1825A
Power Supply	5 volts	6111A
Digital Voltmeter	10 volts	3476A
Resistor	1000Ω 5% 1/4W	0683-1025
Resistor	50Ω 5% 2W	0698-3311
Capacitor	0.1 μF ±20% 25V	0170-0022
Capacitor	10 μF +75 -10% 25V	0180-0059

4-4. LOGIC LEVEL PERFORMANCE TEST

4-5. With test equipment connected as shown in Figure 4-1, proceed as follows:

- Turn power ON on 5004A, all other switches OUT.
- Adjust the 6111A Power Supply to 0 volts. Probe indicator light should be off.
- Vary the Power Supply until probe indicator just light up dimly. Probe tip voltage should be +0.8V, +0.3V, -0.2V.
- Increase power supply voltage until indicator reaches full brilliance. Probe tip voltage should be 2.0V, +0.2V, -0.3V.
- Disconnect test equipment.

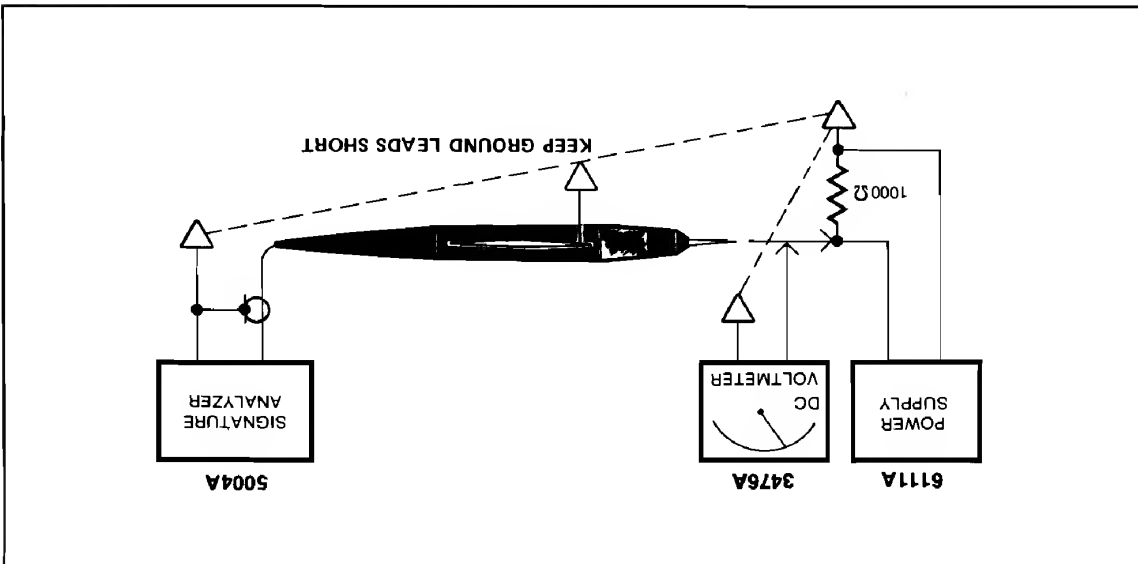
Figure 4-2. Positive Pulse Performance Test Setup



- 4-7. With test equipment connected as in Figure 4-2, proceed as follows:
- Set Pulse Generator to output a positive-going 5-volt/10 ns pulse.
 - Set Pulse Generator repetition rate to approximately one-pulse-per-second. The probe indicator should flash once every second.
 - Disconnect test equipment.

4-6. POSITIVE PULSE PERFORMANCE TEST

Figure 4-1. Logic Level Performance Test Setup



4-8. NEGATIVE PULSE PERFORMANCE TEST

4-9. With test equipment connected as in Figure 4-3, proceed as follows:

- Set pulse generator to output a negative-going pulse.
- Adjust pulse generator to give waveform at probe tip as shown in Figure 4-3, with a repetition rate of one-pulse-per-second. Probe indicator should flash off approximately once per second.
- Disconnect test equipment.

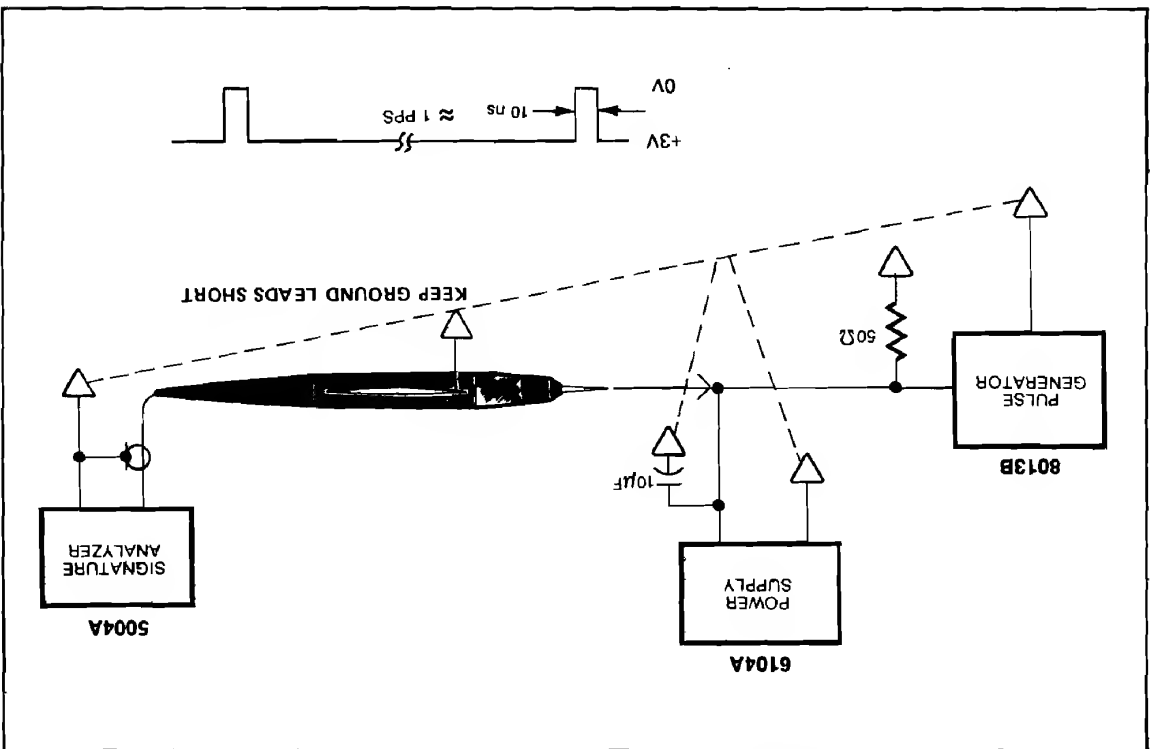


Figure 4-3. Negative Pulse Performance Test Setup

4-10. DATA PROBE SETUP TIME PERFORMANCE TEST

4-11. Connect the equipment as shown in Figure 4-4. Equipment front panel settings:

8013B Front Panel Settings:

Pulse period = 200 ns (5 MHz) in 20 n position
Pulse width = square wave
Amplitude = 5V.

NOTE

Adjust the 8007B pulse width to obtain approximately the same pulse period of 8013B throughout the frequency range.

8007B Front Panel Settings:

External Input — Ext. Trigger
Pulse delay — 5.0 ns position
Pulse width — 5.0 ns position
Slope Polarity +
Transition time — 2.0 ns Leading edge: Fully CCW. Trailing edge: Fully CCW
Symm/Norm/Comp! — NORM
Amplitude = +5V
Output Pulse Polarity +

5328A with Options 040 and 021 Settings:

Function switch TI AVG A-B

Frequency Resolution 10°

Trigger level 1.40 volts

Slope —

CH A +

CH B +

Attenuator —

CH A X1, DC Trig.

CH B X1, DC Trig.

COM switch — SEP

ZIN — 1 MΩ

Oscilloscope 182C/1809A/1825A Settings (the two coax cables must be same length):

Volt/Div — 2V

50 ns/div (positive edge)

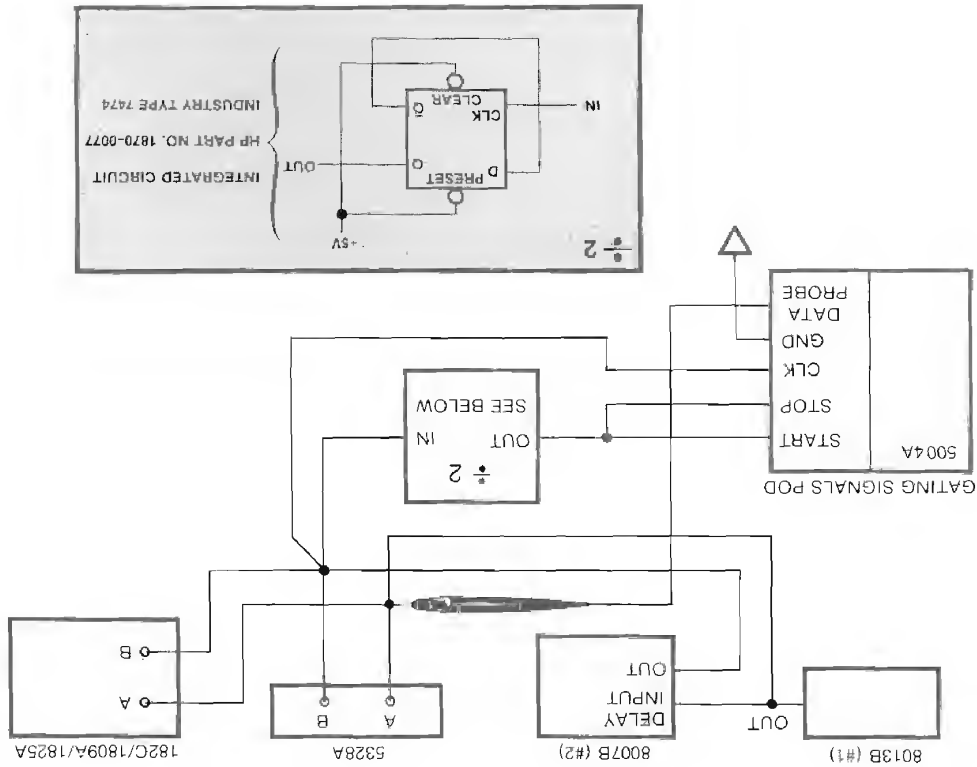
50Ω termination

5004A Logic Tracer Settings:

START, STOP, CLOCK, HOLD, SELF-TEST buttons OUT

LINE OFF/ON — ON

Figure 4-4. Data Probe Setup Time Performance Test



4-15. Table 4-2 is a blank performance test record which may be duplicated and used to keep a permanent periodic record of the performance of a 5004A Signature Analyzer.

4-14. TEST RECORD

4. Disconnect test equipment.
 3. Vary the frequency of 8013B Pulse Generator from 1 Hz to 10 MHz. Adjust the 8007B Pulse Width to obtain approximately the same duty cycle of 8013B throughout the frequency range. Results should be as in step 2.
 2. Set the 5328A Universal Counter FUNCTION switch to FREQ A position. Set the 8007B Pulse Delay vernier to near midrange; the counter's displays should be 1.00000. The display of the 5004A Signature Analyzer should be 0003. Change 5328A FUNCTION switch to TI AVG A-B. The counter reading should be zero nanoseconds. Turn the Pulse Delay vernier slowly clockwise until the 5004A display reads 0000. The counter will read greater than zero nanosecond, indicating that the data doesn't have to remain valid after the clock pulse occurs.
 1. Set the counter's Channel A slope to "-". Set scope's time base to negative edge.
- 4-13. With test equipment connected as in Figure 4-4, and settings as in "SETUP TIME PERFORMANCE TEST" proceed as follows:

4-12. DATA PROBE HOLD TIME PERFORMANCE TEST

8. Disconnect test equipment.
7. Vary the frequency of 8013B Pulse Generator from 1 Hz to 10 MHz. Adjust the 8007B Pulse Width to obtain approximately the same pulse width of 8013B throughout the frequency range. Results should be as in step 3.
- d. Repeat steps 2 and 3.
- c. On 8007B Pulse Generator change the Pulse Delay and Pulse Width switches to the 5 ns position.
- b. Set 5328A Universal Counter FUNCTION switch to TI AVE A-B.
- a. On 8013B Pulse Generator change the pulse period to 100 ns. Counter display should read 10 MHz.
6. Set 5328A Universal Counter FUNCTION switch to FREQ A. Set 5004A Signature Analyzer START and STOP switches OUT ().
5. On 5004A Signature Analyzer, push the START or STOP button IN. Repeat step 2. Turn the 8007B Pulse Delay vernier slowly clockwise until the display on the 5004A is 0001; the counter display will be <15 ns. The display is also indicative of the minimum gate time (one clock pulse between START and STOP signals).
4. On the 5004A Signature Analyzer, push the START and STOP buttons IN. Repeat steps 2 and 3 above. The counter display will be <15 ns.
3. Turn the 8007B Pulse Delay vernier slowly clockwise until the display on the 5004A is 0003; the counter display will be <15 ns.
2. Set the 8007B Pulse Delay vernier to a minimum (CCW). The 5004A Signature Analyzer display should be all zeros (0000).
1. Adjust the 8007A Pulse Width vernier to approximately midrange.

Test Procedure:

Table 4-2. Performance Test Record

HEWLETT-PACKARD COMPANY MODEL 5004A SIGNATURE ANALYZER SERIAL NUMBER _____ Tested By: _____ Date: _____			
Paragraph Number	Test	Min.	Results Actual Max.
4-4	Logic Level (Data Probe Light) Voltage applied: Light Off Light Dim Light Bright	0 +6 +1.7	0 +1.1 +2.2
4-6	Positive Pulse (Data Probe Light) Light Flashing	No Spec	No Spec
4-8	Negative Pulse Performance Light Flashing	No Spec	No Spec
4-10	Data Probe Setup Time Step 2 Step 3 Step 4 Step 5 Step 6a Step 6d(2) Step 6d(3) Step 7	0000 15 ns 15 ns 15 ns 15 ns 10 MHz 0000 15 ns	0000 <15 ns <15 ns <15 ns <15 ns 10 MHz 0000 <15 ns
4-12	Data Probe Hold Time Step 2 Step 3	0003 0 ns 0 ns 0 ns 0 ns 0 ns	0003 0 ns 0 ns 0003 0 ns 0 ns